

CLAIMS

WHAT IS CLAIMED IS:

1. A dispensing method with radio frequency customer identification capabilities for charging a customer for sales transacted by the customer. the method comprising:

determining whether a transponder containing customer identification data is within range of a dispenser, the dispenser requiring activation by the customer to initiate a transaction and including a reader associated therewith for emitting radio frequency signals within the dispenser range, and for receiving customer identification data from the transponder responsive to the emitted radio frequency signals received by the transponder;

determining whether the dispenser has been activated by the customer following a determination that the transponder is within the dispenser range;

upon activation of the dispenser following the determination that the transponder is within the dispenser range, associating the customer identification data received by the reader with a transaction at the activated dispenser, whereupon the transaction at the activated dispenser is permitted and charged to the customer according to the customer identification data.

2. The method of claim 1 further comprising, prior to permitting the transaction at the activated dispenser, determining whether a customer account corresponding with the customer identification data is valid and authorizing a charge of the transaction only to a valid customer account.

3. The method of claim 2 wherein the customer account validity determination includes access to a remote card processing network for account verification.

4. The method of claim 2 wherein the customer account validity determination includes access to a local file for account verification.

5. The method of claim 2 wherein the customer account validity determination occurs following activation of the at least one dispenser.

8 providing an in-range indication to the customer when the transponder is within the vehicle  
9 fueling range;

10 determining whether the dispenser has been activated by the customer following a determination  
11 that the transponder is within the vehicle fueling range;

12 upon activation of the dispenser following the determination that the transponder is within the  
13 vehicle fueling range, associating the customer identification data received by the reader with a  
14 transaction at the activated dispenser, whereupon the transaction at the activated dispenser is permitted  
15 and charged to the customer according to the customer identification data.

1 26. The method of claim 25 further comprising:

2 determining whether a hand-held transponder containing customer identification data is within  
3 a close range of the dispenser, the dispenser reader including a second antenna for emitting radio  
4 frequency signals within the close range, and for receiving customer identification data from the  
5 transponder responsive to the emitted radio frequency signals received by the transponder; and

6 when the hand-held transponder is within the close range before the dispenser is activated,  
7 overriding the use at the dispenser of the vehicle-mounted transponder, whereupon following activation  
8 of the dispenser and association of the hand-held customer identification data received by the reader  
9 with a transaction at the activated dispenser, the transaction at the activated dispenser is permitted and  
10 charged to the customer according to the hand-held transponder customer identification data.

1 <sup>2</sup>27. The method of claim <sup>1</sup>25 wherein the dispenser is a fuel dispenser having a nozzle, and  
2 activation of the dispenser comprises lifting the nozzle.

1 <sup>3</sup>28. The method of claim <sup>1</sup>25 wherein the dispenser is a fuel dispenser having a nozzle lever,  
2 and activation of the dispenser comprises lifting the nozzle lever.

1 <sup>4</sup>29. The method of claim <sup>1</sup>25 wherein the antenna is a hand-held antenna which may be waved  
2 in front of the vehicle mounted transponder for placing the transponder in dispenser range.

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3 30. The method of claim 25 wherein the vehicle includes an on-board computer and the transponder is linkable to the on-board computer for reading vehicle diagnostic information for transmission from the transponder to the antenna.

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2 31. The method of claim 26 wherein a reader is placed inside a service station building for use of the hand held transponder for completing transactions at the service station building reader.

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2 32. The method of claim 25 wherein a reader is associated with a car wash for use of the transponder for completing a car wash transaction.

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9 33. A dispensing system with radio frequency customer identification capabilities for charging a customer for sales transacted by the customer, the system comprising:

means for determining whether a transponder containing customer identification data is within range of a dispenser, the dispenser requiring activation by the customer to initiate a transaction and including a reader associated therewith for emitting radio frequency signals within the dispenser range, and for receiving customer identification data from the transponder responsive to the emitted radio frequency signals received by the transponder;

means for providing an in-range indication to the customer when the transponder is within the dispenser range;

means for determining whether the dispenser has been activated by the customer following a determination that the transponder is within the dispenser range; and

means for, upon activation of the dispenser following the determination that the transponder is within the dispenser range, associating the customer identification data received by the reader with a transaction at the activated dispenser, whereupon the transaction at the activated dispenser is permitted and charged to the customer according to the customer identification data.

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2 34. The system of claim 33 wherein the dispenser is a fuel dispenser having a nozzle, and activation of the dispenser comprises lifting the nozzle.

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1 6. The method of claim 2 wherein the customer account validity determination occurs prior  
2 to activation of the at least one dispenser.

1 7. The method of claim 1 wherein the dispenser is a fuel dispenser.

1 8. The method of claim 1 wherein the transponder is vehicle-mounted.

1 9. A dispensing method with radio frequency customer identification capabilities for  
2 charging a customer for sales transacted by the customer, the method comprising:

3 determining whether a transponder containing customer identification data is within range of  
4 a dispenser, the dispenser requiring activation by the customer to initiate a transaction and including  
5 a reader associated therewith for emitting radio frequency signals within the dispenser range, and for  
6 receiving customer identification data from the transponder responsive to the emitted radio frequency  
7 signals received by the transponder;

8 providing an in-range indication to the customer when the transponder is within the dispenser  
9 range;

10 determining whether the dispenser has been activated by the customer following a determination  
11 that the transponder is within the dispenser range;

12 upon activation of the dispenser following the determination that the transponder is within the  
13 dispenser range, associating the customer identification data received by the reader with a transaction  
14 at the activated dispenser, whereupon the transaction at the activated dispenser is permitted and charged  
15 to the customer according to the customer identification data.

1 10. The method of claim 9 further comprising:

2 defaulting to a manner of processing the transaction at the dispenser that does not charge the  
3 customer according to the customer identification data when a time limit has been exceeded before the  
4 dispenser is activated following the determination that the transponder is within the dispenser range.

1 11. The method of claim 9 further comprising:

2 defaulting to a manner of processing the transaction at the dispenser that does not charge the  
3 customer according to the customer identification data when the customer selects an alternative payment  
4 method.

1 12. The method of claim 9 further comprising:  
2 defaulting to a manner of processing the transaction at the dispenser that does not charge the  
3 customer according to the customer identification data when the transponder is not within the dispenser  
4 range for a specified length of time prior to customer activation of the dispenser.

1 13. The method of claim 9 further comprising:  
2 defaulting to a manner of processing the transaction at the dispenser that does not charge the  
3 customer according to the customer identification data when the transponder is no longer within the  
4 dispenser range following activation of the dispenser.

1 14. The method of claim 9 further comprising:  
2 overriding the provision of an in-range indication to the customer when the transponder has been  
3 previously utilized to complete a transaction at a dispenser within a predetermined time period.

1 15. The method of claim 9 further comprising:  
2 performing customer-specific activities at the dispenser responsive to the customer identification  
3 data received by the reader.

1 16. The method of claim 9 wherein the transponder is vehicle-mounted and the dispenser  
2 is a fuel dispenser.

1 17. The method of claim 9 wherein the transponder is hand-held by the customer.

1 18. The method of claim 9 further comprising deactivating the customer indication upon  
2 completion of the transaction.

1 19. The method of claim 9 further comprising:  
2 upon determining that the transponder is within the dispenser range, displaying at the dispenser  
3 a customer indication to begin the transaction.

1 20. The method of claim 9 wherein the dispenser is a fuel dispenser having a nozzle, and  
2 activation of the dispenser comprises lifting the nozzle.

1 21. The method of claim 9 wherein the dispenser is a fuel dispenser having a nozzle lever,  
2 and activation of the dispenser comprises lifting the nozzle lever.

1 22. The method of claim 9 wherein the dispenser is a dispenser having a select switch, and  
2 activation of the dispenser comprises operating the select switch.

1 23. The method of claim 9 further comprising, prior to permitting the transaction at the  
2 activated dispenser, determining whether a customer account corresponding with the customer  
3 identification data is valid and authorizing a charge of the transaction only to a valid customer account.

1 24. The method of claim 9 wherein the transponder is a read-write transponder so that the  
2 customer identification data of the transponder can include historical transaction information that is  
3 updated upon use.

1 25. A fuel dispensing method with radio frequency customer identification capabilities for  
2 charging a customer for sales transacted by the customer, the method comprising:  
3 determining whether a vehicle-mounted transponder containing customer identification data is  
4 within a vehicle fueling range of a dispenser, the dispenser requiring activation by the customer to  
5 initiate a transaction and including a reader associated therewith for emitting from a first antenna radio  
6 frequency signals within the vehicle fueling range, and for receiving customer identification data from  
7 the transponder responsive to the emitted radio frequency signals received by the transponder;

1           35.     The system of claim 33 wherein the dispenser is a fuel dispenser having a nozzle lever,  
2 and activation of the dispenser comprises lifting the nozzle lever.

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4           36.     The system of claim 33 further comprising means for, prior to permitting the transaction  
5 at the activated dispenser, determining whether a customer account corresponding with the customer  
6 identification data is valid and authorizing a charge of the transaction only to a valid customer account.

1           37.     A dispensing system with radio frequency customer identification capabilities for  
2 charging a customer for sales transacted by the customer using a transponder containing customer  
3 identification data, the system comprising:

4                 a plurality of dispensers each for providing a customer transaction;

5                 an antenna associated with a dispensing area of each dispenser;

6                 at least one reader connected to at least one of the antennas for emitting radio frequency signals  
7 from the antennas within a range of each dispensing area, and for receiving customer identification data  
8 from the transponder, the customer identification data being received by the reader responsive to the  
9 emitted radio frequency signals when the transponder is within the range of the dispensing area;

10                means for synchronizing the emitted radio frequency signals from the antennas to avoid  
11 customer identification data being received by an antenna associated with one of the dispensing areas  
12 from a transponder located in a different one of the dispensing areas; and

13                processing means connected to the at least one reader and to the dispensers for associating  
14 customer identification data received at a dispensing area with a transaction at the associated dispenser,  
15 whereupon the transaction at the dispenser is charged to the customer according to the customer  
16 identification data.

1           38.     The system of claim 37 wherein a first set of the antennas faces a first direction and a  
2 second set of the antennas faces a second direction, the synchronization means comprising means for  
3 causing the radio frequency signal emissions from the first set to occur at different times relative to the  
4 radio frequency signal emissions from the second set.  
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1           39.    The system of claim 37 wherein the synchronization means comprises:  
2                means for causing the radio frequency signal emissions from antennas oriented in directions  
3 generally facing each other to occur at different times relative to each other.

1           40.    The system of claim 37 wherein the radio frequency signal emissions from each antenna  
2 are separated by a sync time between emissions and at least one of the antennas is oriented in a first  
3 direction and at least one of the antennas is oriented in a second direction, such that the synchronization  
4 means causes the antennas oriented in the first direction to emit radio frequency signals during the sync  
5 time of the emissions of the antennas oriented in the second direction.

1           41.    The system of claim 37 wherein the at least one reader includes a master reader having  
2 a processor and at least one channel to which an antenna is connected, and at least one slave reader  
3 having a processor and at least one channel to which an antenna is connected, the synchronization  
4 means comprising:

5                a synchronization signal line connecting the master and slave reader processors;  
6                a synchronization signal operating between first and second states and being generated by the  
7 master reader processor on the synchronization signal line such that when the synchronization signal  
8 is in the first state the master reader processor instructs radio frequency signals to be emitted from the  
9 antenna connected to its at least one channel and the slave reader processor instructs a radio frequency  
10 signals to be emitted from an antenna connected to its at least one channel, thereby synchronizing radio  
11 frequency emissions by the antennas connected to the channels of the respective readers.

1           42.    The system of claim 41 wherein each of the at least one readers includes at least first and  
2 second channels, each having an antenna connected thereto, and wherein the synchronization signal  
3 includes a variable length pulse, the length of which indicates the particular one of the at least first and  
4 second channels, such that the synchronization signal variable length pulse instructs the master and  
5 slave reader processors to emit radio frequency signals on the antennas connected to the same one of  
6 the at least first and second channels at the same time, thereby synchronizing radio frequency emissions  
7 by the antennas connected to the same channels of the at least first and second channels.

1           43. A dispensing system with radio frequency customer identification capabilities for  
2 charging a customer for sales transacted by the customer, the system comprising:  
3 a transponder containing customer identification data;  
4 a dispenser for providing a customer transaction;  
5 antennas each associated with respective dispensing areas on each side of the dispenser;  
6 an in-range indicator to the customer associated with the dispenser for indicating when the  
7 transponder is within the range of one of the dispensing areas; and  
8 at least one reader connected to the antennas for emitting radio frequency signals from the  
9 antennas within a range of each dispensing area, and for receiving customer identification data from the  
10 transponder, the customer identification data being received by the reader responsive to the emitted  
11 radio frequency signals when the transponder is within the range of the dispensing area; and  
12 processing means connected to the at least one reader and to the dispensers for associating  
13 customer identification data received at a dispensing area with a transaction at the associated dispenser,  
14 whereupon the transaction at the dispenser is charged to the customer according to the customer  
15 identification data.

1           44. The system of claim 43 wherein the antennas extend outwardly from opposing sides of  
2 the dispenser and are aligned relative to the dispenser so that one side of each antenna generates an  
3 electromagnetic field downwardly and outward from the dispenser directed toward the dispensing area  
4 and the other side of the antenna generates an electromagnetic field up and away from the other side  
5 of the dispenser.

1           45. The system of claim 43 wherein the antennas extend outwardly from opposing sides of  
2 the dispenser so that the plane of the antenna is substantially perpendicular to the sides of the dispenser.

1           46. The system of claim 43 wherein the range is approximately 60-84 inches in depth from  
2 the side of the dispenser.

1           47.    The system of claim 43 wherein the antennas are short range antennas mounted relative  
2 to the dispenser for use by a hand-held transponder.

1           48.    The system of claim 47 wherein the transponder range of the short range antennas is  
2 approximately three to six inches.

1           49.    The system of claim 43 wherein the antennas comprise:  
2 long range antennas mounted relative to the dispenser for use by a vehicle mounted transponder;  
3 and  
4 short range antennas mounted relative to the dispenser for use by a hand-held transponder.

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1 50. A dispensing system with radio frequency customer identification capabilities for  
2 charging a customer for sales transacted by the customer, the system comprising:  
3 a transponder containing customer identification data;  
4 a dispenser for providing a customer transaction within a dispensing area;  
5 antennas each associated with the dispensing area of the dispenser. the antennas including a long  
6 range antenna located relative to the dispenser for use by the transponder of a type mounted to a vehicle,  
7 and a short range antenna located relative to the dispenser for use by the transponder of a type that is  
8 hand-held;

9 at least one reader connected to the antennas for emitting radio frequency signals from the long  
10 range antenna within a selected long range of the dispensing area, and from the short range antenna  
11 within a selected short range of the dispensing area, and for receiving customer identification data from  
12 the transponder, the customer identification data being received by the reader responsive to the emitted  
13 radio frequency signals when the transponder is within its range of the dispensing area; and

14 processing means connected to the at least one reader and to the dispenser for associating  
15 customer identification data received at the dispensing area with a transaction at the dispenser,  
16 whereupon the transaction at the dispenser is charged to the customer according to the customer  
17 identification data.

51 51. The system of claim 50 further comprising an in-range indicator associated with the  
2 dispenser for indicating to the customer when the transponder is within its range of the dispensing area.

1 52. The system of claim 50 wherein when both the vehicle mounted transponder and the  
2 hand-held transponder are within range of the dispensing area, the processing means overrides the use  
3 of the vehicle mounted transponder for charging the transaction to the customer and instead allows use  
4 of the hand-held transponder for charging the transaction to the customer.

1 53. ~~The system of claim 50 wherein the selected long range comprises a vehicle fueling~~  
2 ~~distance from the dispenser.~~

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54. The system of claim 50 wherein the selected short range comprises a location within several inches from the short range antenna in which the short range transponder may be waved by the customer.

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